March 3, 1959 R. S. ROBINSON 2,875,671

AMMUNITION BELT FEED SYSTEM FOR AUTOMATIC FIREARMS

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Fig. 1.

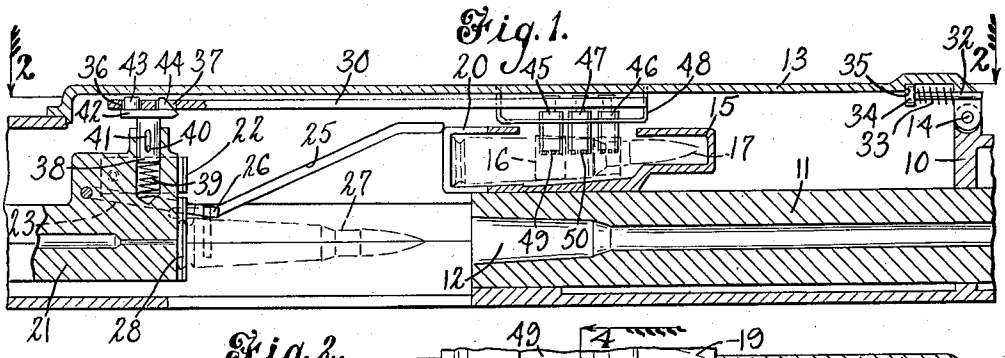


Fig. 2.

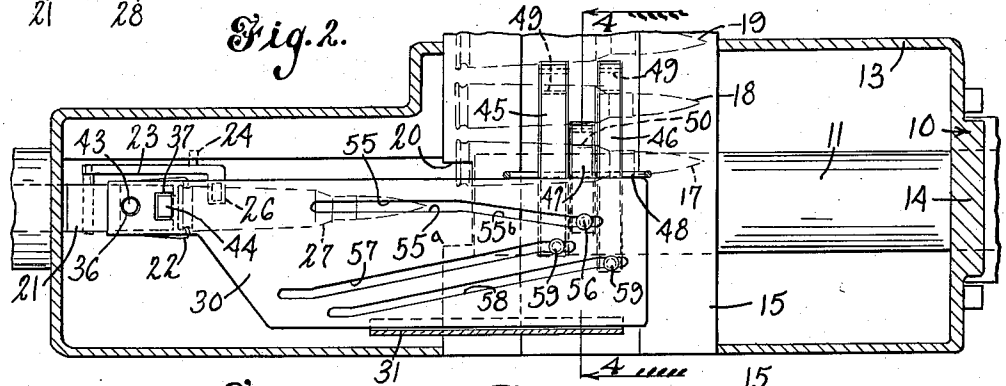


Fig. 3.

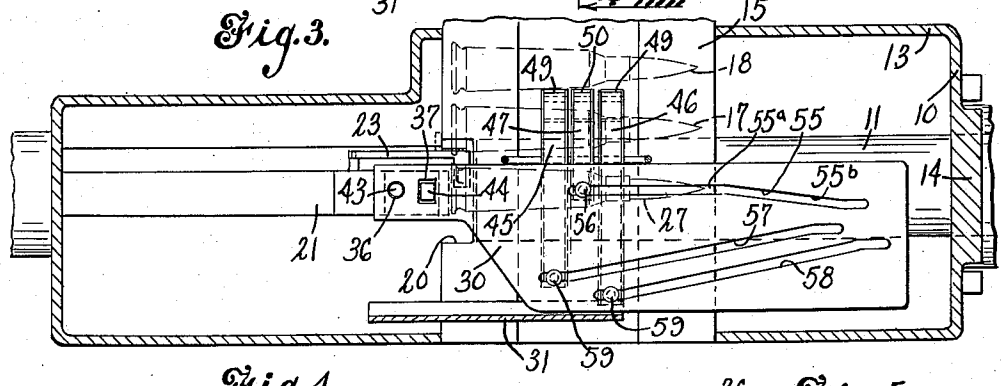


Fig. 4.

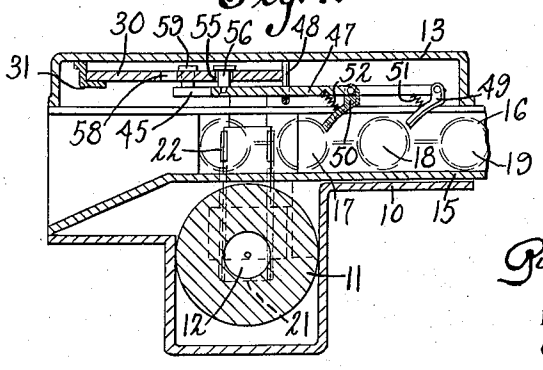
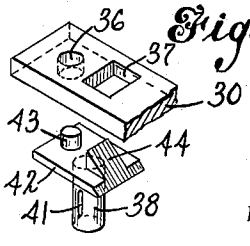


Fig. 5.



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March 3, 1959 R. S. ROBINSON 2,875,671

AMMUNITION BELT FEED SYSTEM FOR AUTOMATIC FIREARMS

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Fig. 6.

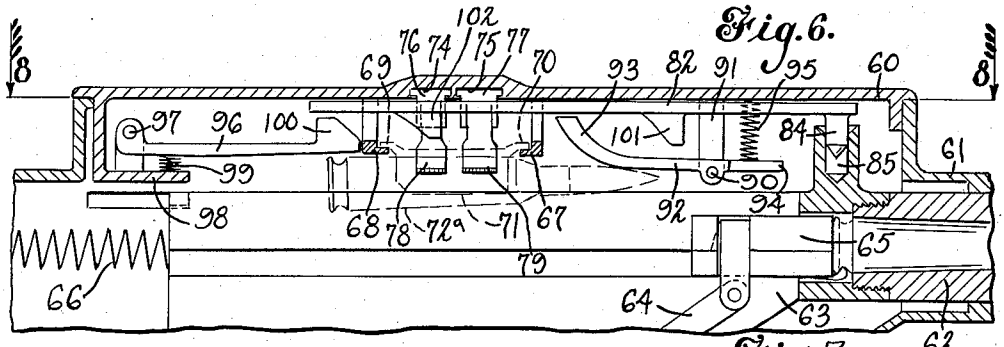


Fig. 7.

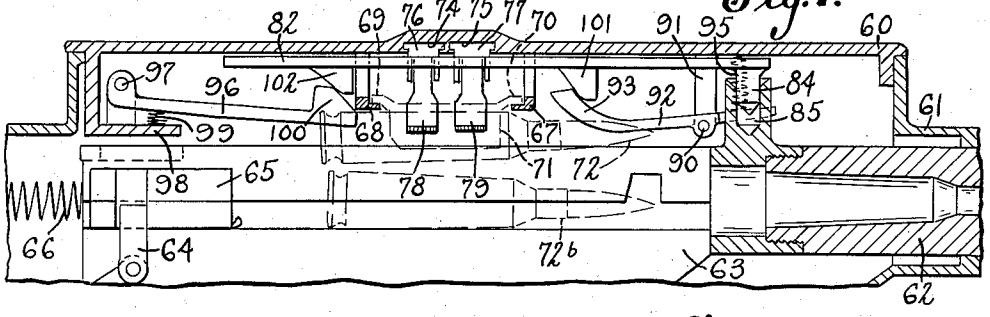


Fig. 8.

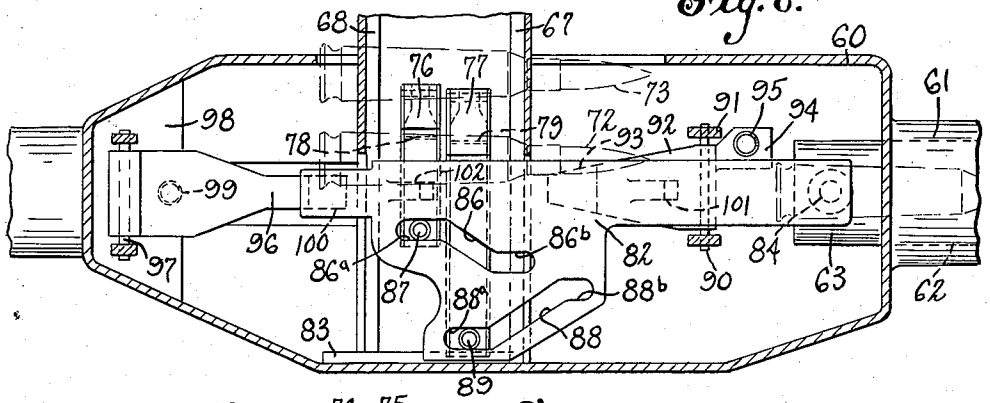
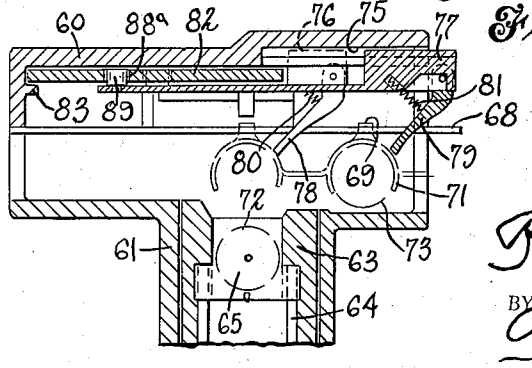


Fig. 10.



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March 3, 1959 R. S. ROBINSON 2,875,671

AMMUNITION BELT FEED SYSTEM FOR AUTOMATIC FIREARMS

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Fig. 9.

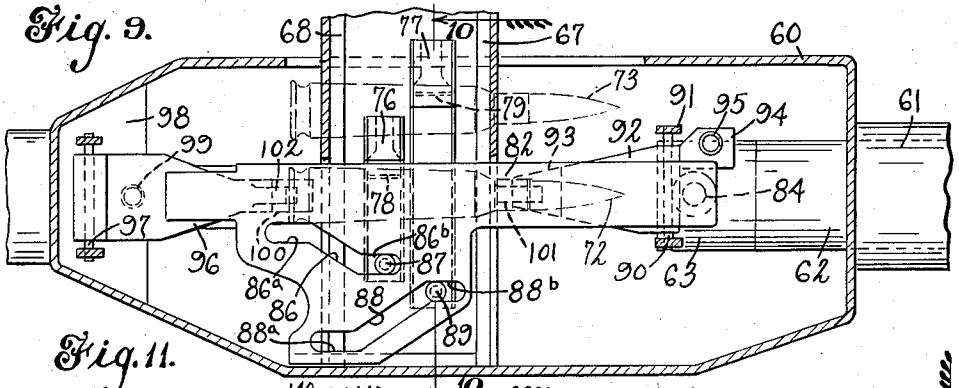


Fig. 11.

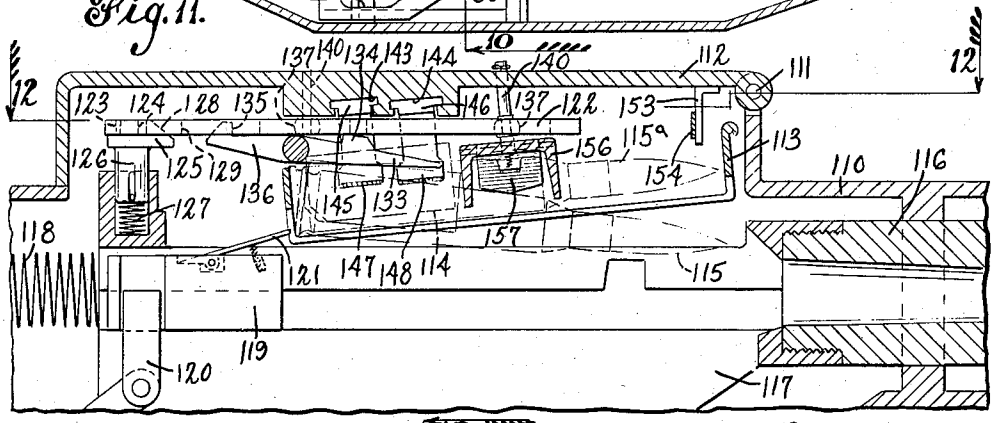
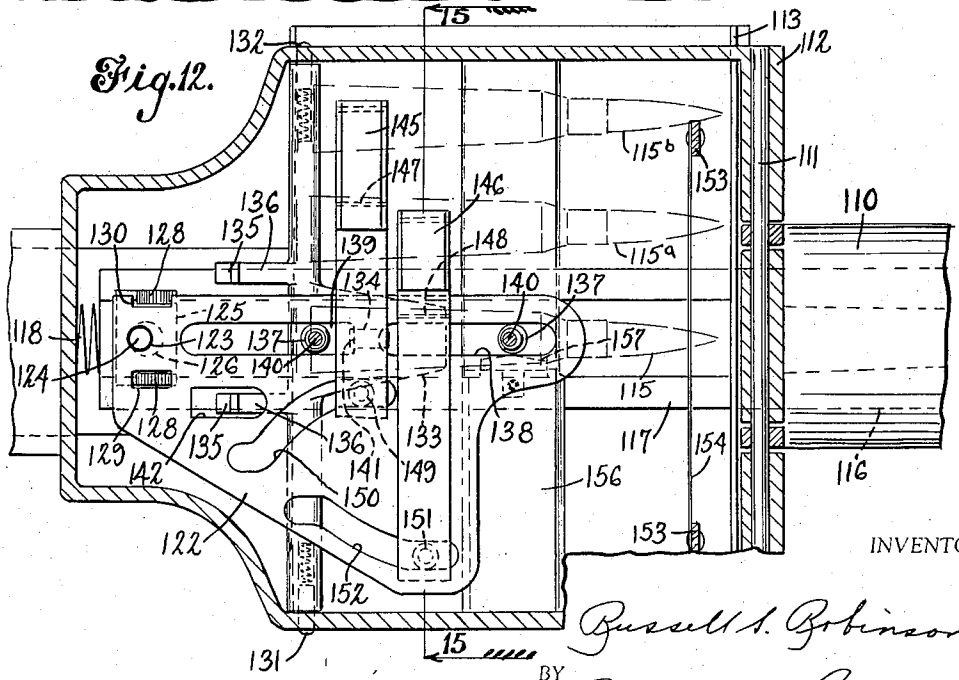


Fig. 12.



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AMMUNITION BELT FEED SYSTEM FOR AUTOMATIC FIREARMS

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Fig.13.

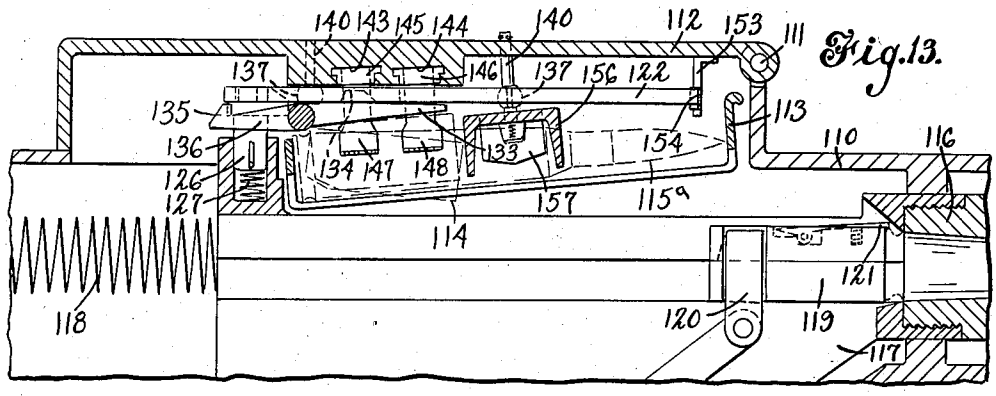


Fig.14.

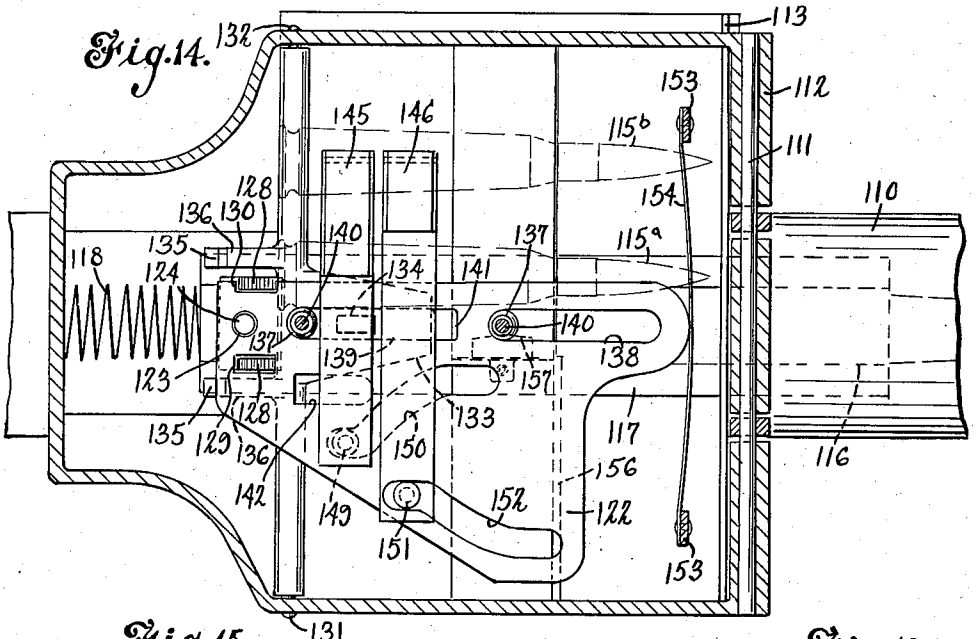


Fig.15.

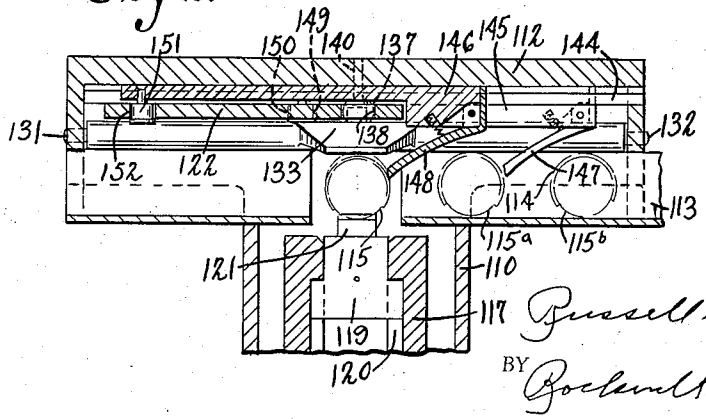
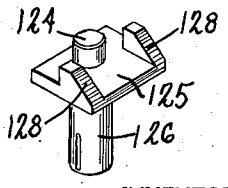


Fig.16.



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United States Patent Office 2,875,671 Patented Mar. 3, 1959

2,875,671

AMMUNITION BELT FEED SYSTEM FOR AUTOMATIC FIREARMS

Russell S. Robinson, Short Beach, Conn.

Application August 6, 1953, Serial No. 372,731

16 Claims. (Cl. 89—33)

This invention relates to automatic firearms, and pertains more particularly to the feed mechanism for feeding the ammunition to an automatic firearm which employs a belt by which the ammunition is carried to the firearm to be loaded into the chamber for firing.

The majority of feeding mechanisms in general use for belt-fed automatic firearms are so constructed as to perform round-by-round feed of the ammunition belt during either the forward or rearward movement of the reciprocable part of the mechanism, whether this part be the barrel extension, the breech bolt, or other recoiling member such as a gas-operated piston. In such systems the belt is held substantially at rest during the other part of the movement so that the cartridge which has been centered or moved to a point in the vertical plane of the chamber can be extracted from or rammed out of the belt and inserted into the chamber. Such a feed system results, of course, in an intermittent feed of the belt as the latter is moved a full cartridge pitch during one half stroke of each operating cycle. The term "cartridge pitch" is used to refer to the distance between the centers of two adjacent cartridges in the belt.

In the feed mechanism, according to the present invention, this intermittency is corrected to a considerable extent in that while the feeding movement may be achieved either during one movement or during both forward and rearward movement of the recoiling member, it preferably is effected partly during one of these movements and partly during the other. This is accomplished by use of a longitudinally sliding cam plate which is fixed during normal operation of the firearm to the recoiling member. This cam plate is provided with one or more cam grooves in each of which is located a follower, which follower is carried by a transverse sliding member or members, each of which carries a belt-feed pawl to engage a part of the belt or the cartridges therein and effect the feed of the belt.

In constructions according to the invention, where feed is performed during both rearward and forward movement of the recoiling member, the heavily accelerated, reciprocating motion of the recoiling member may be made to perform a unidirectional, substantially constant speed and uninterrupted feed of the ammunition belt by firstly contouring each cam groove so as to resemble closely the velocity-time diagram of the forward or rearward movement of the recoiling member during which the feed pawl operating from that cam groove is active, thereby achieving a substantially constant lateral velocity in each feed pawl during its active or feeding stroke, and secondly, by constructing the lateral stroke of each cam groove to be proportional to the time occupied by the rearward or forward movement of the member during which the feed pawl operating from that cam groove is active, thereby achieving a substantially equal velocity for both feed pawls during their respective active strokes.

In known belt feed systems which are applied to the type of belt from which the cartridges are rammed forwardly out of the belt, the centrally fed cartridge usually

has to be thrust downwardly immediately before ramming to place it in the correct level and attitude for ramming, and in some cases it is partially or fully removed from the belt before ramming. In some instances this function is performed by a spring action and in other cases by the positive action of a member operated through the movement of the pawl carrier. According to the present invention this function is performed by the action of one or more transversely pivoted members which are actuated by lugs or cam faces constructed upon the longitudinally sliding cam plate.

Also the belt feed system of known automatic firearms is usually constructed either wholly or partly into the hinged or removable cover of the firearm, and the opening or removing of this cover is usually necessary and desirable in connection with introducing the loaded belt into the gun. As the belt feed system is actuated by a recoiling member housed within the receiver or breech casing, which must register with some part of the belt feed system when the firearm is ready for action in order to secure correct operation of the feed system, it is very often necessary in present constructions for the movement of one of the parts to be effected or maintained manually during the process of closing or replacing the cover in order to secure the correct registration of mating members which connect the recoiling member to a part of the feed system carried by the cover.

In accordance with the present invention, the connection of the feed system to the recoiling member by which it is operated is achieved by means of a vertical plunger carried by the recoiling member and engaging in a recess in the longitudinally sliding cam plate. In order to achieve correct registration of the plunger and recess automatically without having to adjust the parts before or while the cover is being closed or replaced, this plunger may comprise an engaging pin in front of which is fixed a separate beveled lug or lugs of substantially similar height which may be acted upon by the rear edge of the cam plate during the charging operation in order to depress the plunger so that the engaging pin is thrust downwardly out of the operating level until it slides forward under the cam plate, at which time it may rise and engage the point where the recess occurs in the cam plate, and the bevel lug or lugs simultaneously rising into non-engaging voids or oversize holes in the cam plate.

One object of the invention is to provide a new and improved feed system for automatic firearms.

A still further object of the invention is to provide a new and improved feed system for automatic firearms wherein a longitudinally slidable cam plate actuated by a recoiling member is adapted to effect actuation of transversely slidable members, the latter members carrying pawl fingers to effect the feeding of the belt.

A still further object of the invention is to provide a belt-feed mechanism of the character described wherein the belt feed is effected in a substantially continuous movement partly during the rearward movement of the recoiling member, and partly during its forward movement and at substantially constant speed during both rearward and forward movements.

Still another object of the invention is to provide improved mechanism actuated by the sliding cam plate above referred to, to properly position the cartridge for ramming into the chamber.

Still another object of the invention is to provide improved means of connection between the recoiling member and the cam plate actuator for the feed mechanism whereby these two elements will be automatically connected upon opening and closing of the cover of the firearm without the necessity of any manual effort to effect such engagement.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a sectional view of an automatic firearm having one form of my invention applied thereto;

Fig. 2 is a horizontal sectional view on line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 2 but showing the parts in another position;

Fig. 4 is a sectional view on line 4—4 of Fig. 2;

Fig. 5 is a detail perspective view of the plunger and rear portion of the cam plate by which these parts are connected;

Fig. 6 is a vertical sectional view through a firearm showing a modified form of my invention;

Fig. 7 is a view similar to Fig. 6 showing the parts in another position;

Fig. 8 is a horizontal sectional view on line 8—8 of Fig. 6;

Fig. 9 is a view similar to Fig. 8 showing the parts in another position;

Fig. 10 is a sectional view on line 10—10 of Fig. 9;

Fig. 11 is a vertical sectional view of a firearm showing a further modified form of my invention;

Fig. 12 is a horizontal sectional view on line 12—12 of Fig. 11;

Fig. 13 is a view similar to Fig. 11 showing the parts in another position;

Fig. 14 is a view similar to Fig. 12 showing the parts in position of Fig. 13;

Fig. 15 is a horizontal sectional view on line 15—15 of Fig. 12; and

Fig. 16 is a detail perspective view of the plunger carried by the recoiling member.

To illustrate one embodiment of my invention I have shown in Figs. 1 to 5 of the drawings a firearm comprising a receiver **10**, a barrel **11** fixed thereto, the barrel being provided at its breech end with the usual chamber **12**. A cover or feed housing **13** may be hinged to the receiver at **14** and latched in place by any usual means, not shown.

A feed chute **15** is mounted in fixed position within the receiver, this feed chute being of proper cross sectional shape to receive and guide therethrough the cartridges in an ammunition belt **16**, the cartridges being shown in dotted lines at **17**, **18** and **19**. This feed chute is provided with a slot **20** in its rear face to permit rearward extraction therefrom of the cartridges when the latter have been fed into a central position with respect to the chamber.

The cartridges may be extracted from the belt by the reciprocating bolt **21**, which for this purpose is provided with resilient extractor members **22** which may engage the rear of a cartridge in the ammunition belt when the cartridge is at its central position. Pivoted to the bolt **21** is a lever **23** having a guide lug **24** adjacent its forward end which rides in a cam groove **25** in the housing wall. The forward end **26** of the lever **23** is turned laterally or transversely and is adapted to engage the cartridge as it is moved rearwardly from the ammunition belt by the bolt and force it downwardly in line with the chamber **12**, as shown, for example, at **27** in Fig. 1. In this position the cartridge is held by the extractor members **28** which are also secured to the bolt, and it will be understood that in its movement downwardly from its level in the ammunition belt to the level of the chamber, it slides downwardly from the extractors **22** to the extractors **28**.

A cam plate **30** is slidably mounted at the undersurface of the housing member **13** and guided for longitudinal movement by a member **31** fixed to this member. A plunger **32** is supported at the forward end of the housing, this plunger being urged outwardly or to the left, as shown in Fig. 1, by a spring **33** so that its head **34** normally rests against the shoulder **35** on the member **13**, this plunger **32** acting as a resilient stop for the cam plate **30**.

This cam plate is provided adjacent its rear end with an opening **36** of relatively small diameter and an opening **37** of greater width than the opening **36**. Mounted in a socket in the recoiling member (which in this instance is illustrated as the bolt **21**) is a plunger **38** spring pressed upwardly by the spring **39**, the movement of the plunger being limited by a pin **40** secured to the bolt and disposed within a slot **41** in the plunger **38**.

The plunger **38** carries at its upper end a plate **42** which supports a stud or boss **43** adapted to fit fairly snugly in the opening **36** of the cam plate **30** so as to provide an operating connection between these parts and effect the forward and rear reciprocation of the cam plate upon forward and rear movements of the recoiling member or bolt **21**. Mounted forwardly of the boss **43** is a beveled lug **44** of considerably greater width than the boss **43**, which lug is adapted to be received in the opening **37** of the cam plate. The opening **37** provides ample clearance for the lug **44** so that the latter is inoperative during the firing of the gun. It will be apparent, however, that the boss **43** cannot enter the opening **36** until the lug **44** registers with the opening **37** and that, as the beveled surface of the member **44** faces forwardly, the bolt or recoiling member may move forwardly with respect to the cam plate when the members are not engaged, and upon such relative movement the plunger **38** will be cammed downwardly in the socket of the bolt by the beveled lug **44**. However, when the member **44** registers with the opening **37**, the plunger will spring upwardly and engage the boss **43** in the opening **36**. Therefore, if the cover or housing **13** is closed when the bolt is too far rearwardly for these parts to register, they will register and become engaged upon forward movement of the bolt without any attention on the part of the operator.

Slidably mounted upon the undersurface of the housing member **13** and below the cam plate **30** are slide members **45**, **46** and **47**, the latter being intermediate the members **45** and **46**. These members may be held in place by a guide or guides **48** so that they have free sliding movement transversely of the axis of the firearm. Each of these members carry spring-pressed pawl members, those connected with the slides **45** and **46** being designated by the numeral **49**, while the pawl member **50** is connected to the slide **47**. The connection between these pawls and their slide members is a pivotal one, and the pawls are urged outwardly from the slides or downwardly, as shown in Fig. 4, by springs **51** and **52** so that the pawls will be urged into engagement with the cartridges in the belt **16**.

The cam plate **30** is provided with a cam groove **55** within which rides a cam follower **56** secured to the intermediate pawl slide **47**. From Figs. 2 and 3 it will be apparent that as the cam slide is reciprocated longitudinally by the recoiling member the cam slot **55** will, by reason of the engagement of the cam follower **56** therein, effect transverse reciprocation of the slide **47**. At its rear end the cam slot **55** is provided with a portion **55a** which is substantially in line with the axis of the gun but the forward portion **55b** is directed at an angle to the rear portion so as to move the follower **56** and slide **47**.

The slide **30** is also provided with cam slots **57** and **58**, and riding in each of these slots is a follower **59**, one of which is secured to the slide **45** and the other to the slide **46**. The slots **57** and **58** stand at an angle to the axis of the gun for substantially their entire lengths so that the reciprocation of the slide will effect transverse reciprocation of the pawl slides **45** and **46**, and this reciprocation will have a greater range than that given the slide **47** by the forward portion **55b** of the cam slot **55**. Preferably the feed movement of the belt effected upon each movement of the cam plate is proportional to time

required for the movement of the bolt in that direction. That is, if the recoil occupies 40% of the time of a complete bolt cycle, the belt will be fed a distance equal to 40% of a cartridge pitch during the recoil and the remainder during the runout.

The operation of the gun may now be briefly described. In Fig. 3 of the drawings the parts are shown in the position which they occupy when the recoiling member or bolt **21** is in its forward position, and the cartridge **27** is in a centralized position above the chamber but in substantially the vertical plane through the chamber axis. The pawl members **49** carried by the slides **45** and **46** have, by engagement with the cartridge **17**, moved the cartridge belt into the position shown in this figure, and it will be understood that a cartridge lies in the chamber below the cartridge **27** ready for firing. When the gun is fired and the recoiling member **21** moves rearwardly, the cam plate **30** will be moved therewith, thus moving the slides **45** and **46** in an upward direction, as shown in Figs. 2 and 3, or to the right, as shown in Fig. 4, in order to cause the pawls **49** to engage the link carrying the next cartridge **18**. During the first part of this movement the follower **56** is engaged in the straight portion **55a** of the cam slot **55** so that the slide **47** remains substantially stationary and holds the belt immobile while the cartridge **27** is extracted rearwardly from the belt. During the latter part of the rearward movement of the plate **30**, however, the follower **56** rides in the forward portion **55b** of the cam slot and causes the pawl **50** to move the belt forwardly a given distance by engagement with the cartridge **17**. When the bolt reaches its rear position, the parts are in the position shown in Figs. 1, 2 and 4. In this position the cartridge **27** has been moved downwardly to be engaged by the extractors **28** and is in position to be rammed forwardly into the chamber. Also the belt has been moved forwardly a short step from the position shown in Fig. 3 so that the link which carried the cartridge **27** is slightly beyond the axis of the barrel, but the link which carries the cartridge **17** has not yet been centered with the axis of the barrel.

When the bolt moves forwardly, the cam slots **57** and **58** act upon the slides **45** and **46** and cause these slides to move to the left, as shown in Fig. 4, and by engaging the cartridge **18**, move the cartridge **17** into a centrally fed position, shown in Fig. 3. It will be seen that the ammunition belt is fed through the distance of a cartridge pitch in two steps and that the step effected by the pawls **49** upon the forward movement of the cartridge is the greater of the two, this being effected, of course, by the shape of the cam slots **57** and **58** with respect to the shape of the slot **55**. It will, of course, be understood that any desired ratio between the lengths of the two feed steps may be effected by a change in the shape of these cam slots.

In the form of my invention shown in Figs. 6 to 10 inclusive, there is illustrated a feed housing **60** connected to the casing **61** within which is slidably supported a barrel **62** to which is connected the barrel extension **63**. In this case the barrel recoils in the usual manner and the barrel extension **63** is connected by a linkage **64** to a bolt **65** to effect reverse and forward movements of the bolt upon the recoil and return of the barrel, the latter being returned by the spring **66** acting on the barrel extension.

Depending from the housing **60** are guide rails **67** and **68** upon which are supported fins **69** and **70** of the cartridge belt **71**, which belt carries cartridges **72** and **73**. The housing member **60** is provided upon its lower face with lipped or T-shaped slots **74** and **75** within which are slidably mounted pawl slides **76** and **77**. Pivoted to these slide members are pawls **78** and **79** urged outwardly from the slide members by springs **80** and **81**, as shown more especially in Fig. 10.

As will be hereinafter more fully explained the pawl

members **78** and **79** are adapted to be laterally reciprocated alternately with respect to the axis of the barrel so that one of the slides moves outwardly while the other is moving inwardly. Thus the pawl members **78** and **79** are adapted to alternately engage the belt links of the belt **71** and effect inward feeding of the belt to centralize the cartridges or bring them into alignment with the barrel. In the outward movement of the slides the pawls are cammed upwardly against the tension of the springs **80** and **81** so as to ride over the links so as to engage the far sides thereof.

Slidably mounted upon the undersurface of the housing **60** is a cam plate **82**, this plate being supported in guideway **83** for sliding movement in a longitudinal direction. At the forward end of the plate is a downwardly extending pin **84** engaged in a socket **85** in the barrel extension so that movement of the latter effects corresponding movement of the cam plate.

As shown more especially in Figs. 8 and 9, the cam plate is provided with two cam slots. One of these slots has an intermediate portion **86** at an angle to the axis of the barrel and end portions **86a** and **86b** substantially parallel to the axis of the barrel. The slide **76** is provided with a cam follower **87** engaged in this slot. The other slot in the cam plate is also provided with an intermediate portion **88** disposed at an angle to the axis of the barrel and end portions **88a** and **88b** substantially parallel to the axis of the barrel, and a follower **89** is provided upon the pawl slide **77**, which follower is disposed within this slot. It will be apparent, therefore, that as the cam plate is reciprocated by the recoil and return of the barrel extension, the slides **76** and **77** will be caused to reciprocate transversely of the casing and, by engagement with the links of the belt **71**, effect step-by-step feeding of the belt, one of the steps taking place upon the rearward movement of the recoil member or barrel extension and the other taking place upon the forward movement. As shown, these steps are approximately equal but their relative magnitude depends, of course, on the configuration of the cam slots **86** and **88** and, if desired, more or even all of the feeding movement may be caused to take place upon movement of the barrel extension in one direction or the other.

Pivotally mounted at **90** between arms **91** carried by the housing **60** is a pivoted centralizer **92** having at one end an upwardly directed portion **93**. The other or tail end of this member **94** is urged downwardly by a spring **95** disposed between the housing **60** and the tail **94** of the lever so as to maintain the lever in the position shown in Fig. 6. Similarly a centralizer **96** is pivoted at **97** to an angle member **98** secured to the housing **60** and is urged in a counter-clockwise direction about its pivot by the spring **99**. At its forward end the centralizer **96** is provided with a cam lug **100**.

Upon the lower side of the came plate **82** are provided a pair of lugs **101** and **102**, the first of these lugs being adapted to cooperate with the end **93** of the centralizer **92** and the second adapted to cooperate with the cam lug **100** of the centralizer **96** to move the centralizers downwardly to free a cartridge from the belt **71**. It will be seen from Figs. 6 and 7 that as the cam plate **82** moves rearwardly from the position shown in Fig. 6, the lug **101** will strike the end **93** of the centralizer **92** and the lug **102** will strike the lug **100** of the centralizer **96** swinging these members downwardly about their pivots **90** and **97**. If the ends of these centralizers are in engagement with a centralized cartridge, shown at **72a** in Fig. 6, this causes the cartridge to drop out of the belt **71**, as shown at **72b** in Fig. 7, into alignment with the bolt **65** (which is in its rearward position) so as to be rammed into the chamber upon the forward movement of the bolt.

The operation of this modification of my invention is as follows. As shown in Figs. 6 and 8, the barrel is in its forward position with a cartridge in the chamber, and the cartridge **72** is approximately the distance of one half

a cartridge pitch from its central position. The slide **76** is in its outer position as the follower **87** is at the rear end **86a** of its cam slot, as shown in Fig. 8, and the pawl **78** is in engagement with the link which holds the cartridge **72**. Upon rearward movement of the barrel extension and bolt, the cartridge **72** is first fed into central position by the action of the cam slot portion **86** upon the follower **87**, and the slide **77** is moved outwardly to engage rearwardly of the next link of the belt **71**.

As the slide reaches its rearward position and the follower **87** moves into the slot portion **86b** of the cam plate **82**, the centralizers **93** and **96** are depressed by the lugs **101**, **102** and the cartridge **72**, which has just been centralized, is positioned downwardly out of the belt, as shown at **72b** in Fig. 7. The position now occupied by the parts is shown in Figs. 7, 9 and 10 wherein the barrel extension, the bolt and the cam plate are in their rearward positions.

In this position of the parts the cartridge at **72b** is ready to be rammed into the chamber and slide **77** has been moved outwardly with its pawl **79** in engagement with the next link of the belt **71**, as shown in Fig. 10. When the barrel extension and bolt move forwardly, the slide **77** will be moved inwardly, thus feeding the next cartridge **73** approximately one-half step into the position formerly occupied by the cartridge **72** (as shown in Fig. 8). The cartridge at **72b** will have been pushed into the chamber and the parts of the gun are in battery position.

In the form of my invention shown in Figs. 11 to 16 the ammunition belt is fed into the firearm at a substantially constant speed. As illustrated, the feed mechanism is applied to a firearm having a spring-urged barrel and barrel extension which have a substantially constant acceleration in the forward direction from its full recoil position to the firing position, and a substantially constant deceleration from the firing position rearwardly to the recoil position. Also, as illustrated, there is a relatively short belt link at the rear of the cartridge, and owing to the nature of the breech bolt mechanism, the cartridge in the rammed position is thrust clear of the belt during the early period of the runout of the barrel assembly.

In this form of my invention a casing is shown at **110** to which is pivoted at **111** a feed housing **112**. Within this feed housing is removably supported a feed tray **113** which performs the belt-guiding function and which is sloped forwardly and upwardly. Through this tray is fed a belt comprising links **114** which links carry cartridges **115**, **115a** and **115b** (Fig. 12), the cartridges projecting forwardly from the links.

Slidably mounted within the casing **110** is the usual barrel **116** and the barrel extension **117**, these members being comprised in the barrel assembly and being urged forwardly by the usual spring **118**. A bolt **119** is slidably mounted in the barrel extension and connected thereto by the lever system **120** so that the bolt will be moved forwardly and rearwardly by the recoil and advance of the barrel extension and, of course, through a greater range of movement. The bolt may carry an upwardly spring-pressed ramming finger **121** to engage a centralized cartridge and move it into the chamber.

A cam plate **122** is slidably mounted at the lower face of the housing member **112** which may slide between the positions shown in Figs. 11 and 13, this cam plate being provided with an opening **123** adapted to receive a boss **124** mounted on the head **125** of a spring-pressed plunger **126** mounted in a socket in the barrel extension **117** and urged upwardly by the spring **127**. Upon the head **125** of the plunger **126** are a pair of cam lugs **128** adapted to be received respectively in an opening **129** and a recess **130** in the cam plate **122**. It will be understood that this provides an automatically engaging connection between the barrel extension and the cam plate **122** such as was explained in the description of the modification of my invention shown in Figs. 1 to 5. That is, the cam lugs **128** will hold the plunger **126** downwardly until they register with the openings **129** and **130** at which time the boss **124** will register with the opening **123** and permit a driving connection to be made between these parts.

Pivotally mounted at the opposite sides of the housing **112**, as shown at **131** and **132**, is a centralizer **133**, this centralizer being provided with an actuating lug **134** and a pair of return lugs **135**, the latter being formed upon arms **136** extending rearwardly from the body of the centralizer. The centralizer supports the cam plate **122** from below against the underside of the housing **112**, and the plate is guided in its forward and return sliding movements by two spherically shaped rollers **137** which operate in slots **138** and **139** formed in the cam plate. These rollers are carried by pins **140** secured to the housing **112**.

The front end of the guide slot **139** is squared, as shown at **141**, and makes an actuating face for the front end of the lug **134** on the centralizer **133**, and the cam plate also is provided with an elongated opening **142**, the rear end of which is substantially square to make an actuating face for one of the return lugs **135** of the centralizer. It will be understood that the other lug **135** is engaged in the opening **142** when the cam plate is inverted in order to be applied to a gun in which the ammunition belt is fed in the opposite direction.

Supported in guide grooves **143** and **144** in the housing **112** are feed slides **145** and **146**, these feed slides carrying spring-pressed pawls **147** and **148** (Fig. 15) designed to engage the links of the belt **114** and effect the feed thereof. The slide **145** is provided with a follower **149** disposed within a cam slot **150** in the plate **122** having laterally offset end portions, as shown in Fig. 14, while the slide **146** is provided with a follower **151** disposed in an oppositely contoured slot **152** in the cam plate **122**. The lateral displacements of the cam slots are substantially proportional to the runout and recoil time respectively of the recoiling member (in this instance the barrel assembly) of the firearm so that the feed will be substantially constant. It will, of course, be obvious with this arrangement that the slides are alternately actuated in opposite directions by the action of the cam slots **150** and **152** on the followers **149** and **151**. The feed slides are tilted forwardly and upwardly at the same angle as the feed tray and belt.

Secured to depending lugs **153** carried by the housing **112** is a transversely extending spring member **154** which serves as a bumper for the cam plate **122** at the forward end of its travel. A guide or stop member **156** is carried by the housing **112** with which the fed-in cartridges will substantially come into contact when they reach a centralized position, and pivotally carried adjacent the outer end of this stop is a spring-pressed finger or flange **157** adapted to engage the cartridges after they have been swung downwardly by the centralizer **135** and hold them in a downwardly inclined position for feeding into the barrel chamber, which position is shown at **115** in Fig. 11.

The operation of this form of my invention may now be briefly described. When the barrel extension and cam plate **122** are in recoiled position, as shown in Fig. 11 and Fig. 12 (the cam plate being locked to the barrel extension by the plunger **126** and boss **124**) and with the loaded belt seated so that the link carrying cartridge **115** is in the central position aligned for ramming, the forward movement of the barrel extension begins. The breech bolt moves forward at a considerably greater velocity and rams the cartridge **115** clear of the link **114** which holds it at an early stage in the runout of the parts. Simultaneously the cam slot **150** forces the slide **145** inwardly so that pawl **147** will feed the next link with cartridge **115a** inwardly at a substantially constant speed having regard to the contour of the slot and to the reasonably constant acceleration of the barrel assembly.

This moves the cartridge 115a to the position shown in Fig. 14.

When the firing station is reached, the explosion halts and reverses the movement of the parts in a very short time. The pawl 148 carried by the slide 146 which is operated by the follower 151 and slot 152 is moved inwardly during the return or recoil stroke of the cam plate and completes the feed stroke at substantially constant lateral velocity. This moves the cartridge from the position shown at 115a in Fig. 14 to the position shown at 115 in Fig. 12. Toward the end of the rearward movement of the cam plate the opening 142 passes over the return lug 135 of the centralizer 133, and the actuating lug 134 which has been riding within the slot 139 of the cam plate is depressed by the squared front end of this member. The centralizer, thus depressed, rocks the link of the belt 114 with which it engages and swings the cartridge in that link from the upwardly tilted position shown at 115a in Fig. 11 to the downwardly tilted position shown at 115 in this figure. During the early part of the following runout after this cartridge 115 has been rammed clear of the link which holds it and the cam plate 122 has moved forward so that the slot 139 again registers over the lug 134 and the lug 135 is contacted by the squared rear end of the opening 142, the centralizer is returned to its upward or inactive position.

While I have shown and described some preferred embodiments of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. In an ammunition feed belt system for an automatic firearm having a housing and a longitudinally reciprocable element therein actuated by discharge of the firearm, a member operatively mounted in the housing for translatory reciprocating movement in a direction transversely of the housing, said member having pawl means to engage and feed the ammunition belt, and connecting means between said element and said member to effect transverse reciprocation of the latter upon longitudinal reciprocation of the former, said connecting means comprising an actuator connected to said element to reciprocate therewith longitudinally of the housing and provided with a cam slot and a follower carried by said member and engaged in said slot.

2. An ammunition feed belt system as in claim 1 wherein a second transversely reciprocating member is provided in the housing to feed the ammunition belt and carries a follower engaged with a second cam slot in said actuator and wherein said second member is moved in a feeding direction alternately with said first member.

3. An ammunition feel belt system as in claim 1 wherein a second transversely reciprocating member is provided in the housing to feed the ammunition belt and carries a follower engaged with a second cam slot in said actuator and wherein said second member is moved in a feeding direction alternately with said first member, and one of said members acts during recoil of said longitudinally reciprocable element and the other during runout thereof.

4. An apparatus as in claim 2 wherein the cam slots are so shaped that said members are moved at substantially constant speed.

5. In an ammunition feed belt system for an automatic firearm having a housing and a longitudinally reciprocable recoiling member therein actuated by discharge of the firearm, an ammunition feed tray supported by the housing and sloped at a substantial angle to the barrel axis, a substantially longitudinally sliding cam plate connected to the recoiling member to be reciprocated therewith in a longitudinal direction, a spring-urged feed pawl mechanism actuated by the cam plate in a translatory movement and in a direction substantially transverse to the direction of movement of the latter, said pawl mechanism comprising a slide member between the cam plate and the housing and said housing having a guide groove in which said slide member is mounted.

6. A mechanism as in claim 5 wherein the connection between the pawl mechanism and the cam plate comprises a cam groove in said plate, a portion of which is at an angle to the barrel axis, and a follower on said pawl mechanism engaged in said groove.

7. A mechanism as in claim 5 wherein said guide grooves in the housing are tilted at substantially the same angle as the tray.

8. In an automatic firearm, a receiver, a cover housing movably mounted thereon, a reciprocable recoiling member therein actuated by discharge of the gun, an ammunition belt feed system including a longitudinally sliding member in the housing connected to the recoiling member to be actuated thereby, a transversely movable member having a feed pawl thereon adapted to engage and feed the ammunition belt, said last-named member being actuated by said longitudinally sliding member, a cartridge-depressing member movably carried by the housing to engage and move a centralized cartridge to ramming position, and means on said longitudinally sliding member to engage and actuate said cartridge-depressing member.

9. A mechanism as in claim 8 wherein means are provided to effect a positive return of said cartridge-depressing member to normal position after it has been moved by said longitudinally sliding member.

10. A mechanism as in claim 8 wherein a pair of cartridge-depressing members are provided to strip the cartridge from the belt in a downward direction.

11. An ammunition belt feed system as in claim 8 wherein a spring detent member is pivotally mounted in the housing about an axis substantially parallel with the barrel axis to engage over a cartridge after depression thereof and retain the cartridge in depressed position.

12. In an ammunition feed belt system for an automatic firearm having a housing and a longitudinally reciprocable recoil member actuated by the discharge of the firearm, a longitudinally sliding cam plate connected to the recoiling member to be actuated thereby, a feed member operatively mounted in the housing for translatory reciprocating movement in a direction transverse to that of the movement of the cam plate and having pawl means to engage and feed the ammunition belt, said cam plate being provided with a cam slot and said transversely reciprocating member having a follower engaged in said slot, said connection between the recoiling member and said cam plate comprising a spring-pressed plunger upon one of said members and an opening in the other member to engage said plunger.

13. In an ammunition feed belt system for an automatic firearm having a housing and a longitudinally reciprocable recoil member actuated by the discharge of the firearm, a longitudinally sliding cam plate connected to the recoiling member to be actuated thereby, a feed member operatively mounted in the housing for translatory reciprocating movement in a direction transverse to that of the movement of the cam plate and having pawl means to engage and feed the ammunition belt, said cam plate being provided with a cam slot and said transversely reciprocating member having a follower engaged in said slot, said connection between the recoiling member and said cam plate comprising a spring-pressed plunger upon one of said members and an opening in the other member to engage said plunger, and cooperating means on said plunger and said other member to depress the plunger upon relative movement between said recoil member and said cam plate.

14. A mechanism as in claim 5 wherein the slide member of the pawl mechanism is tilted at an angle to the barrel axis, and the connection between the pawl mechanism and the cam plate comprises a cam groove in

the cam plate and a spherical roller carried by the pawl mechanism and engaged in said groove.

15. Mechanism as in claim 3 wherein the cam slots are so shaped that the distance over which the belt is moved by one pawl is unequal to that over which it is moved by the other pawl.

16. Mechanism as in claim 3 wherein the cam slots are so shaped that the distance over which the belt is moved by one pawl is unequal to that over which it is moved by the other pawl and is proportional to the time occupied by each part of the feed cycle.

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